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Embracing Uncertainty in the Conduct of Monetary Policy

Introduction

Uncertainty is top of mind for many people. This is the case whether it is related to the future of trade agreements, job security—as economies become more automated—or threats from geopolitical tensions in many parts of the world. Actually, economic news in several advanced economies has recently been surprising people on the upside. At the same time, many feel like the world is becoming more and more uncertain. Canada is no exception.

For central bankers like me, there is nothing particularly new in this, even though the sources of concern are changing over time. This is evident to those who remember the oil price shock in the 1970s or Black Monday in the 1980s, among other turbulent events. Our job has always been to steer the right course for monetary policy in the face of uncertainty. Today, as some central banks contemplate shifting gears, it will be critical to understand how uncertainty is factored into monetary policy decisions if you want to understand and anticipate policy actions.

In my remarks this evening, I will dig into this set of issues in the context of Bank of Canada policy. Your organization, the Money Marketeers of New York University, is dedicated to fostering discussion of relevant policy issues. So, it is the perfect place to do this, and I would like to thank you for the invitation.

I will structure my remarks around three observations that are explored in a discussion paper I worked on with my colleagues Rhys Mendes and Stephen Murchison.¹ Put simply, the three observations are the following:

¹ R. Mendes, S. Murchison and C. Wilkins, “Monetary Policy Under Uncertainty: Practice Versus Theory,” Bank of Canada Staff Discussion Paper No. 2017-13 (November 2017).

I would like to thank Stephen Murchison for his help in preparing this speech.

- 1) Uncertainty is a fact of life.
- 2) Monetary policy can become asymmetric when uncertainty is embraced.
- 3) Uncertainty is not a reason for paralysis in decision making.

It is no surprise that our work uncovered areas where further research is most needed to improve the framework for dealing with uncertainty. I will get to that as well.

Uncertainty Is a Fact of Life

So, let us start with my first observation. Uncertainty has always been a fact of life for everyone. And, like many businesses and households, central banks have established techniques to reduce, where possible, the level of uncertainty they experience. The Bank has devoted considerable effort to reducing uncertainty by being clear about the objectives of monetary policy and the framework for achieving those objectives. The inflation-control agreement with the Canadian federal government has been in place for the past quarter of a century. It provides a clear objective for monetary policy and operational independence for the Bank.²

We also invest continuously in state-of-the-art forecasting models. For example, we recently updated one of our main projection models to include a richer role for indebted households in the transmission of monetary policy—a timely innovation, given that household debt has increased notably in Canada in recent years.³ We use competing models to inform our deliberations when possible. This is like getting your investment advice from more than one broker. We are also exploiting multiple sources of information, such as surveys of businesses, to improve our reading of the economy.

It would be fabulous if these efforts could eliminate uncertainty altogether, but the real world is not so obliging. The reality is that researchers are aiming at a moving target, given ongoing structural change in the economy, such as the aging of the population. And there is also the possibility of the truly unexpected, such as natural disasters. That means a considerable degree of uncertainty is irreducible at any given time. In the current context, the Bank is particularly focused on data that indicate how wages and potential output are progressing, as well as the effects of the two interest rate increases we made over the summer. And we are following trade negotiations closely.

² The inflation-control agreement is renewed every five years. For the latest agreement, see the [*Joint Statement of the Government of Canada and the Bank of Canada on the Renewal of the Inflation-Control Target*](#).

³ See the appendix in the October 2017 Bank of Canada *Monetary Policy Report* for details on recent enhancements to ToTEM, one of the Bank of Canada's main projection models.

So how does the Bank deal with this irreducible uncertainty in practice? Like many other central banks, we use projection models that capture key economic relationships to produce a forecast. This forecast includes the monetary policy actions likely to be needed to bring inflation back to our 2 per cent target over the projection horizon. The necessary policy actions are generated by what we call a simple “monetary policy rule.”

This policy rule captures the Bank’s average historical behaviour and does not change with the level or sources of uncertainty. Because of that, it is as if uncertainty has been set aside. This is closely related to “certainty equivalence” in the monetary policy literature, which is akin to aiming for the bull’s eye, even though you know there are winds that may move your arrow in some unknown direction.⁴ While this is a useful starting point, it is insufficient.

In fact, there is a rich economic literature that shows why this framework applies only in a limited set of circumstances that do not look very much like the real world.⁵ The market participants here will know first-hand how much volatility can affect investment behaviour, even when expected returns are unaffected. And some investors, to avoid tail risks on the downside, may decide to forgo higher expected returns.

Quantifying how best to respond to uncertainty requires knowledge of the type and degree of uncertainty. It is manageable in some cases, but it is a tall order in others. In practice, we are faced with uncertainty about the retreat from globalization and threats to peacetime relationships. We are also faced with uncertainty of a more positive nature, like the promise of digitalization for productivity growth and structural reform in emerging economies. And, we are faced with scenarios in which even the range of outcomes is unknown. In these cases, statistical estimates based on the past are obviously of little help.

The current uncertainty around the future of the North American Free Trade Agreement (NAFTA) and related policies is a case in point. We have incorporated an estimate of the effects of uncertainty on business investment and exports to better balance the risks. At the same time, we have assumed no change to trade agreements in the base case. And, aside from the estimated uncertainty effects, we have not factored possible changes in trade relations into our current stance of monetary policy either. Instead, we are following developments very closely. We have mapped out the main channels of transmission of a rise in protectionism. And we are sharpening our modelling

⁴ In most cases, central bank models do not use fully optimal rules for projection purposes, so the resulting policy path implied by these models is not certainty-equivalent, in the strict sense. Here, we mean that by construction the parameters and functional forms of the policy rule, however chosen, do not change as uncertainty is introduced.

⁵ Certainty equivalence applies to linear-quadratic frameworks. The central bank is assumed to have a zone quadratic loss function (i.e., it seeks to minimize inflation from the target and cares equally about deviations above and below the target), the model is linear and shocks are additive (i.e., they do not change the underlying structure of the economy).

tools so that we can incorporate any concrete developments into the projection, should they occur.⁶ This approach is consistent with how we've treated uncertainty surrounding other trade agreements in the past, such as the Canada-European Union Comprehensive Economic and Trade Agreement (CETA) and the Trans-Pacific Partnership (TPP).

So, in practice, central banks start with a formal framework that is consistent with certainty equivalence. We then apply judgment to account for the main sources of uncertainty considered to be missing from the framework.

When Monetary Policy Becomes Asymmetric

This leads me to my second observation. Monetary policy can become asymmetric when uncertainty is taken seriously in policy design. This can lead policy-makers to deviate substantially from the simple world of certainty equivalence.

It is here that our understanding can greatly benefit from cross-checking our logic with the economic literature on how to conduct monetary policy under uncertainty. To illustrate, let me discuss two situations that are particularly relevant in the current context—the first leads to more-aggressive policy actions and the second leads to what is often referred to by central banks as “caution” or “patience.”

When uncertainty can motivate aggressive policy action

The first situation is best illustrated by considering how to conduct monetary policy when interest rates are close to the effective lower bound (ELB).

We all likely remember when central banks, including the Bank of Canada, reduced interest rates aggressively when financial markets seized up in 2008. Knowing what we know today—that the biggest global recession since the Great Depression was about to begin—these policy actions seem self-evident. I can tell you, they were less evident in real time. When we compare our policy actions with what would have been prescribed based on our past behaviour, we can see that the response was exceptional. The Bank eased monetary policy significantly more than usual, by as much as 2 percentage points more at one stage.

This increased aggressiveness is a textbook example of optimal policy when there is the possibility of being constrained by the ELB.⁷ While this constraint is mitigated by the availability of unconventional monetary policy tools, it is not eliminated, because there is considerable uncertainty about their effectiveness.⁸ The Bank's actions 10 years ago reduced the chance that this constraint would

⁶ See Box 1, “Potential Implications of a Rise in Trade Protectionism” in the April 2017 Bank of Canada *Monetary Policy Report*.

⁷ The intuition behind this is demonstrated clearly in R. Kato and S.-I. Nishiyama, “Optimal Monetary Policy When Interest Rates Are Bounded at Zero,” *Journal of Economic Dynamics and Control* 29, no. 1–2 (2005): 97–133.

⁸ For the Bank of Canada's unconventional monetary policy toolkit, see the [Framework for Conducting Monetary Policy at Low Interest Rates](#) published in December 2015.

bind by generating additional economic momentum going into the recession. So even though gross domestic product and inflation fell, they fell by less than they would have if the pace of cuts had been slower. As a result, the only unconventional tool the Bank needed to use at the time was communicating extraordinary forward guidance in the form of a conditional commitment to keep interest rates unchanged.⁹

A principle we can draw from this experience is that policy should respond more aggressively to negative shocks when rates are near the ELB than when they are far from it, all else being equal. Policy is also asymmetric in that it responds more aggressively to negative shocks than to positive shocks. And the reality is that we will be closer to the ELB more often than in the past because of a lower neutral rate of interest. Based on our assessment that the ELB in Canada is around -50 basis points, the probability of being at the ELB is around 8 per cent, approximately five times higher than it was 15 years ago.¹⁰

While this may be the optimal strategy, central banks could potentially achieve lower volatility of inflation and less buildup of financial vulnerabilities from credit if they were more confident about the effectiveness of unconventional policy tools. That is why it is so important that we refine the design of unconventional policy tools such as quantitative easing and deepen our understanding of the strength of their transmission to the real economy.

When uncertainty leads to caution

There are also times when uncertainty can lead to caution or patience. This is my second example. Just three weeks ago, the Bank decided to leave the policy rate unchanged. We said at the time that while less monetary policy stimulus will likely be required over time, Governing Council will be cautious in making future adjustments to the policy rate.

One of the motivations for caution is that inflation has been in the lower end of the inflation target bands of 1 to 3 per cent for quite some time. To see why this might matter, it helps to recall why the inflation target bands were chosen in the

⁹ In its [announcement](#) on April 23, 2009, the Bank made the following conditional commitment: “Conditional on the outlook for inflation, the target overnight rate can be expected to remain at its current level until the end of the second quarter of 2010 in order to achieve the inflation target.”

¹⁰ Some estimates for the United States are as high as 40 per cent. Much of this difference with Canada can be explained by differences in methodology rather than fundamentals. For example, raising the assumption of the ELB to zero and reducing the degree of interest rate smoothing to zero in the policy rule increases the estimate of the probability to around 25 per cent for Canada. For an explanation on how the probability of being at the ELB is calculated, see J. Dorich, N. Labelle St-Pierre, V. Lepetyuk and R. Mendes, “Could a Higher Inflation Target Enhance Macroeconomic Stability?” Bank of Canada Staff Working Paper (forthcoming).

first place. The 1 to 3 per cent range primarily reflects the recognition that there is a degree of imprecision associated with inflation targeting.¹¹

While some normal fluctuations can be expected within the target range, central banks may become disproportionately concerned about the prospect that inflation might fall outside the range. This is referred to in the economic literature as a “kinked loss function.”¹² In plain language, it means that the central bank puts a greater weight on the downside risks when inflation is low to begin with. What is important to note about this line of reasoning is that it also applies to situations in which inflation is close to the upper part of the range.

Even if inflation were closer to the middle of the range and the ELB was not a consideration, caution might still be in order. In Canada, one reason for caution is that there is currently greater uncertainty about the strength of the monetary policy transmission mechanism. While higher household debt has likely heightened the sensitivity of spending to interest rate increases, it is difficult at this juncture to know by how much. There is also uncertainty about the interaction of interest rate increases with the recent tightening of macroprudential rules.¹³ The logic behind caution in this case is often referred to as Brainard’s principle of attenuation: policy should change less than it would if the central bank were more sure of the effect on spending.¹⁴

Another reason for caution—in this case more of a “wait-and-see” approach—is related to a desire to avoid having to reverse policy direction abruptly in the future.¹⁵ Since the adoption of fixed announcement dates in November 2000, the Bank of Canada has changed its policy interest rate 46 times, and only four of these were reversals within a six-month window. If you look at the behaviour of other central banks, it is very similar—so it is not much of a surprise that other central banks have also cited uncertainty as a rationale for waiting.¹⁶

¹¹ See S. S. Poloz, “Understanding Inflation: Getting Back to Basics” (speech to CFA Montréal and Montreal Council on Foreign Relations, Montréal, Quebec, November 7, 2017).

¹² An example of this would be a zone quadratic loss function. See A. Orphanides and V. Wieland, “Inflation Zone Targeting,” *European Economic Review* 44, issue 7 (June 2000): 1351–87.

¹³ See [Guideline B-20 issued by the Office of the Superintendent of Financial Institutions](#).

¹⁴ See W. Brainard, “Uncertainty and the Effectiveness of Policy,” *American Economic Review* 57, no. 2 (1967): 411–25. For an excellent discussion of this principle and its limitations, see V. R. Reinhart, “Making Monetary Policy in an Uncertain World,” Proceedings, Economic Policy Symposium, Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming (2003): 265–74.

¹⁵ This is shown in a formal economic model in Mendes, Murchison and Wilkins, “Monetary Policy Under Uncertainty.”

¹⁶ A. Al-Nowaihi and L. Stracca, “Non-Standard Central Bank Loss Functions, Skewed Risks and Certainty Equivalence,” European Central Bank Working Paper No. 129 (March 2002).

For the business people in the room who have considered large capital expenditures, this reasoning must sound familiar. It can be useful to have the option value of waiting until you are more sure of the returns. This is particularly true if the investment is largely irreversible.

As with investment, fixed costs of changing policy direction may explain a central bank's aversion to reversals and motivate a wait-and-see approach to policy. That said, it is unclear how costly policy reversals are for the real economy. It is possible that the perceived costs are self-reinforcing because reversals are so rare that they are viewed as policy errors when they do occur, rather than as a sensible reaction to new information.

Uncertainty Is Not a Reason for Paralysis in Decision Making

Now for my final point. Uncertainty is not a reason for paralysis in decision making. Whether it is about how aggressive or how cautious policy should be, getting the dosage right demands sound judgment about complex trade-offs. Just think about my last example about the wait-and-see approach. In central banking, there is no equivalent to the "late-mover advantage." But even for a business, delaying investment too long leaves it vulnerable to the competition.

Checking the logic of this judgment through formal modelling exercises is good practice to inform our assessment of these trade-offs and to support decisions that stand the test of time.

That is why research efforts at the Bank are focused on some key areas. In particular, we are working to better model the dynamics between the real and financial sides of the economy, particularly the triggers for financial instability. This continues to be a blind spot. Related to this is work to measure the effectiveness of macroprudential measures and unconventional monetary policy tools. There is also significant work under way studying inflation and wage dynamics, as Governor Stephen Poloz spoke about last week in Montréal. A longer-term objective relates to incorporating the effects of uncertainty that households and businesses face in their own decision making. These efforts will help improve base-case projections.

We supplement these projections with model-based risk scenarios. For example, Bank staff recently published an alternative scenario in which the economy's potential output grows faster than projected.¹⁷ We are also focusing our efforts on designing policy rules that are more robust to the types of uncertainty we encounter every day.

Strengthening the policy framework will support not only sound decision making, but also transparency. If you want to understand why policy actions were taken and what actions might be in store, you need to understand both the Bank's

¹⁷ J. Yang, B. Tomlin and O. Gervais, "Alternative Scenario to the October 2017 MPR Base-Case Projection: Higher Potential Growth," Bank of Canada Staff Analytical Note No. 2017-18 (October 2017).

base-case projection and how the Bank has factored uncertainty into its policy decisions.

We have numerous ways to explain these two elements.¹⁸ These range from discussion in the risk section of the Bank's quarterly *Monetary Policy Report* (MPR) to the opening statement at the press conference that follows its release. We also have speeches like this one today. We have decided, starting next year, to advance the timing of speeches providing economic updates to align them more closely with the fixed announcement dates between MPRs. These speeches will be given by Governing Council members and will be followed by a question-and-answer session with media. Of course, no communications tool will be effective if we do not reach our audience. That is why we continue to advance our digital strategy to communicate in ways that match how people prefer to receive information these days.

Conclusion

It is time to wrap up. Uncertainty is a fact of life for all of us. Central bankers have well-established methods to deal with uncertainty in the conduct of monetary policy.

When uncertainty is taken seriously, it can lead to asymmetric monetary policy responses. I explained why policy may respond to negative shocks more aggressively than usual when near the effective lower bound on interest rates. I also explained why, during periods of uncertainty like today, a cautious approach may be prudent.

Caution has its limits, because there are complex trade-offs involved, including those related to financial stability. The Bank of Canada is investing heavily in research that will help better quantify these trade-offs and the interaction with macroprudential policy measures.

As we move forward, it will be critical that people like you and other central bank watchers stay engaged and share your own ideas on how to further strengthen the monetary policy framework under uncertainty.

¹⁸ See S. Kozicki and J. Vardy, "Communicating Uncertainty in Monetary Policy," Bank of Canada Staff Discussion Paper No. 2017-14 (November 2017).